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Embodying computer simulations

In my previous essay I argued that introducing a technological system in a social space has its impact on that space. If a system doesn't have an impact at all it is unlikely to function as the designers or their clients intended it. Philip Agre wrote about this principle in 1994 already, using industrial automation examples, and I reinterpreted his writing for the situation in 2011 with Facebook and Google as examples. In this essay I want to propose a method for revealing the social impact of computer systems upon society. Once exposed the social implications of digitalization's should be discussed critically in my opinion.

Technical systems can have influence upon social systems in a number of ways. For this essay I will focus upon the effects of oversimplification. The most famous example of simplification is the formula to calculate the speed of a moving object. In this formula the friction which slows down the object slightly is left out of the calculation because it is often negligible. Sometimes however it is not and then you could say that the formula in question is an oversimplification of reality.

Simplification doesn't only takes place in a mathematical and physics context, but in other domains as well. For instance in the domain of language. Consider the word refrigerator. It's impossible for that word to convey the maximum cooling a specific device can achieve. Therefore using that word to refer to that specific object will be a simplification of what the refrigerator really is. Just as the speed of a moving object is not the real speed, but an approximation. Often the simplification of language is not a problem, but later I will give an example where it was. Another domain where simplification takes place is history. Because language is often used to describe the past, history will also be liable to simplifications. Again I will give an example where a simplification turned into oversimplification later on. Drawing the line between simplification and oversimplification is not always easy to make, because people may differ in their opinion of the importance of the difference between a model and reality, especially in non-exact contexts.

A tool that can be used to draw the attention to simplifications is embodiment. As soon as somebody is confronted with the refrigerator object, that he or she was only talking about before, a lot of the

properties, that may not have been communicated through language, become evident in a second. Think about size, colour and even age. Just as an image can say more than a thousand words so can embodiment reveal that which was unsaid before. With embodiment, in contrast to a single image, one can even open the refrigerator to see the maximum cooling temperature! Embodiment can be a powerful tool for realization processes.

I will now give two examples of how embodiment can reveal oversimplifications and after that an example of how embodiment can be misused to falsify reality. Then I will finish with how embodiment as used in the examples could also be applied to the analysis of computer programs.

Theatre of the Oppressed (TO) is a theatre methodology that was first applied by the Brazilian Augusto Boal in the 60's and early 70's. He used it to empower poor Brazilians. On one occasion he helped a woman who was willing to confront her husband with his adultery, but she was unsure how to deal with it (Boal, 1995). Boal's method changed over the years, but at the time of this story Boal would allow the audience to give suggestions to the actors who would then play them out. A large muscular slightly terrifying woman did the suggestion to "have a clear conversation". The actors obliged, but the ending didn't change for the woman in the improvisation and could be dismissed as useful. This is normal, but the woman who did the suggestion became furious accusing Boal of discrimination against woman by undermining their suggestions. Boal assured her that the actors did their best, but if she wasn't pleased, maybe she could try it herself. "May I?" the woman asked. "You may!" Boal answered. What happened then was an impressive example of realization or de-simplification. The strong woman took the broom that was used by the woman for cleaning and turned it into an instrument of punishment. She grabbed the actor and kept beating him while giving a lecture about husband and wife relationships until she had made her point "clear". From this point on Boal would always ask the audience to act out their solution themselves. He says that solutions are "personal, unique and non-transferable" (Boal 1995, p. 7). By embodying solutions, instead of oversimplifying them using words in an attempt to transfer meaning, the audience can make obvious what otherwise may get loss in the process to make it abstract.

Writer Jennifer Allen talks about re-enactment as having a similar quality as the theatre of Boal. She says that "The re-enactment often searches for a lost totality. Take the re-enactment of a crime, where the pieces of a puzzle are put together through a careful re-staging of the misdeed" (2009, p. 59). In other words by embodying a piece of history (be it a crime or another event) you fill out the blanks that have been caused by a simplification. An example where the embodiment of history really surprised me

was the staging of a scientific experiment called "Obedience To Authority" designed by Stanley Milgram. In the experiment it was investigated if people would keep obeying authority even if it meant that they would mortally wound somebody. It was investigated whether the research subjects, who were told to played the role of a teacher, would keep disciplining their students, even if they got hurt. The people who played the students were in fact part of the experiment and would only act out that they were injured by the punishments the subjects would give them. The results were shocking. It seemed that 80% of the subjects were prepared to seriously hurt somebody if ordered to do so. This experiment was re-enacted by the artist Rod Dickinson. By doing this an essential simplification for the believability of the experiment fell away. It turns out that the pain is acted out by the students through the medium of a tape recorder. Using a tape recorder means a total block of non-audial signals like face expressions and other body language. The biological system that triggers empathy for another person is triggered mostly by facial expression. This is even so much so that people without a face get the feeling that they are no longer a part of society at all as pointed out by Frans de Waal. (De Waal, 2009, p. 99). In the book that Milgram (1974) wrote he states that whenever immediacy is increased less people are willing to obey authority. When the participants have to touch the person they are hurting, only 30% will go all the way by virtually killing the other. These additional results that are usually left out confirm that when humans are face-to-face they are overall more emphatic than loyal to authority. My knowledge of the experiment came mostly from journalistic writing. However by seeing the experiment embodied I immediately realized a flaw in the design that wasn't obvious in the experiments inscribed form.

Unfortunately embodiment can also work the other way and mask reality with a veil of lies. This is the case with the Hollywood film "Saving Private Ryan". A scene in Spielberg's film, that re-enacts the Ohama Beach landing on 6th of June 1944, shows a picture of war where everybody is shooting and the soldiers are all keen on killing Germans, even the ones that surrender and form no threat. The way the plot unfolds reveals the ideology of Spielberg, which makes him bend the truth. Sparing a life is a weakness that can prelude your own death according to Spielberg, because a German soldier who gets spared half-way the film returns at the end as an uber-strong killing machine, who single handedly kills one of the sympathetic characters with his bare hands. In the same end scene an ammunition carrier is portrayed by Spielberg as a coward and weakling. Earlier in the film the same personage insisted on sparing the Germans who surrender. However in the end the ammunition carrier "redeems" himself by shooting the Germans. The way that the Ohama beach landing is contradicting the eye witness account of a World War II survivor. Lieutenant colonel Dave Grossman wrote a book about killing in a military context called "On Killing". According to this book there are only a few men with a killer instinct:

"only one in five soldiers ever shut a gun in WWII. The other four were brave, faced grave dangers, have landed on beaches and saved comrades under hostile fire, gathered ammunition for others, etc., but never fired a bullet." (quoted in De Waal, p. 242). So instead of everybody shooting, only one in five were prepared to fire against the enemy. However some would help their comrades that were firing by getting them ammunition. This is regarded by Grossman as a brave act instead of a weak one like Spielberg is suggesting. Spielberg's re-enactment is an obvious example where a re-enactment is re-framing a simplification in a light untruthful to reality.

In a society where ambiguous computing becomes more and more important I think it is essential to keep a discourse about software design choices alive. My previous essay talked about how programming languages like C++ are designed to capture reality in a digital representation. The world literally gets translated in numbers (digits). This means that a system necessarily leaves out a lot of details. It simplifies in other words and there should be discussion about how computer systems may oversimplify reality. By embodying the representation, that is made to exist in the computer, there is an opportunity to critically analyse how the world is perceived and represented by the creators of the system and start a discussion about the consequences of these choices upon our society.

In my opinion "Evolving Virtual Creatures" by Karl Sims is an example of a system which oversimplifies reality. In this paragraph I will explain why I come to this conclusion. Katherine Hayles (2005, p. 193) describes Sims "Evolving Virtual Creatures" as follows: "Yearning for the light, the creatures struggle after it. In water they grow tails and learn to undulate like snakes. On land, they clump along, relegated by fate and biology to rectangular shapes joined together with moveable hinges. They show extraordinary ingenuity in making the most of these limitations, crawling, hopping, jumping, always toward the light". The piece Hayles describes is about virtual creatures that, through the digital simulation of evolution, get to move and act in a virtual space. These actions are not scripted by Karl Sims, but the behaviour-like patterns emerge from his simulation of evolution. In the beginning of the simulation a diverse group of creatures is created and then fitness criteria determine which creatures reproduce. (Hayles, 2005, p.195). The use of language is revealing here. Sims uses "fitness" which according to Hayles (2005, p. 195) means: "[fitness is] determined according to how successful the creatures are in reaching various goals – following a light in three-dimensional space, and time". The title Sims uses for his creation suggests it has everything to do with evolution, but Darwin talked about a principle of adaptation instead of survival of the fittest. The phrase "survival of the fittest" was coined by Herbert Spencer a contemporary of Darwin (De Waal, 2009, p.40). The difference between survival of the fittest and adaptation is that in the first it is all right to kill and oppress the weak, since it

is a law of nature that only the strong deserve to live. While adapting to your environment is an act that takes others much more into account. At the heart of its design "Evolving Virtual Creatures" displays the signifiers of an ideology that promotes selfishness. This could be a non-intended meaning by Sims, but it seems otherwise since as soon as he succeeded in making these creatures walk he set the simulation up in such a way that they would compete with each other. "the successful survive" (archive.org) according to a description found on internet. In such an environment it is no problem to thrive at the expense of another. The design of "Evolving Virtual Creatures" and the way the creatures behave seems to belong to a scientific tradition called game theory. This theory is developed by American mathematician and Nobel price winner John Nash, who analysed poker games. The theory states that if players pursue a selfish strategy an equilibrium will emerge where non of the players gain anything, but where they are also ensured that they won't loose anything. However they have to assume that their fellow players are just as selfish as they are to reach this equilibrium that promotes the status quo (Curtis, 2007). This principle that applies in a mathematical poker game has been applied in many fields including computer science, a range of social sciences and evolutionary biology. Here is where the controversy starts, because many scientists think that game theory doesn't apply to these fields. One of them is Frans de Waal a professor in biology at the Emory University in Atlanta. He states for instance that genes can't be selfish, but at most self-promoting (De Waal, 2009). He also argues that empathy and helping others, including strangers, is a biological given that we share with many of our close relatives in the animal kingdom. Applying game theory in every social context does not make sense in that case, because their will be a context where choosing a selfish strategy goes against ones biology. Even Nash the father of game theory admits, after recovery from paranoid schizophrenia, that he was wrong in applying game theory to most social fields. Sims made his evolving creatures act in a selfish way, even though the exact way how they were selfish wasn't under the control of Sims. I think we need to conclude that Sims made this environment and that life doesn't necessarily rely completely on a survival of the fittest mechanism on all levels of being. It is striking that after fifteen years this simulation of evolution has not come up with a way to make a creature walk on two or four legs gracefully. At an attempt to copy the self-generating properties of life Sims has heavily oversimplified it.

I have embodied a computer system similarly to that of Sims. At times the enactment of the system, and seeing the imperfect movements done in real life, has reopened the discourse around its design and doubtful propositions. There is however a lot of room for improvement in this practice. In the future I would like to investigate how you can increase the immediacy of a realization, because the current realizations if any only happen after a conversation. It would also be interesting to see if embodiment

can start a discussion about other design flaws as described in my previous essay like a failing logic and re-arrangement of human behaviour. Finally it may be good to look at other systems. Contemporary internet platforms like Google, Facebook, Twitter and Microsoft 365 would be an obvious choice, but I'm also thinking about the system put in place to bring the American economy in equilibrium mentioned by Curtis (2011) in his documentary or other (historic) systems with an impact upon society. Although this practice is far from perfect at the moment, I am excited about the idea to investigate it further and I hope to write about it soon.

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